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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,590	01/18/2005	Mitsunori Toyoda	122397	2777

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EXAMINER

NGUYEN, HUNG

ART UNIT PAPER NUMBER

2851

DATE MAILED: 07/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/521,590

Applicant(s)

TOYODA, MITSUNORI

Examiner

Hung Henry V. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-38 is/are pending in the application.
- 4a) Of the above claim(s) 26-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/18/05 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/18/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of group I (claims 13-25) in the reply filed on May 19, 2006 is acknowledged. The traversal is on the ground(s) that "the search and examination of the entire application could be made without serious burden". This is not found persuasive because while group I is explicitly drawn to an illumination optical device comprising a diffractive optical element with particular structure, group II is related to an illumination optical device having a refractive optical element with particular structure. As such, the distinct and separate searches are quite extensive and places serious burden on the Examiner in regard to both search and examination.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification lacks adequate support for the claimed limitations of "wherein the diffractive optical element.... Having an energy density of 100 mJ/cm²/pulse or more passes".

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4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. As to claim 14, the limitation of “wherein the diffractive optical element.... Having an energy density of 100 mJ/cm²/pulse or more passes” is vague and indefinite (see rejection under 35 U.S.C. 112, first paragraph, supra).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 13-18, 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al (US 2002/0030890 A1 in view of Hiraiwa et al (U.S.Pat. 5,699,183).

With respect to claims 13-15, 18-19 and 24-25, Kato et al discloses an illumination optical system and corresponding method (see figure 12) for illuminating an irradiated plane with light from a light source (11) supplying pulse laser light (see section [0046]) and comprising: a diffractive optical element (12) arranged in an optical path between the light source and the irradiated plane (R) and an optical material forming the diffractive optical element includes an oxide crystal material such as quartz crystal or sapphire (see section [0038]; [0060])

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wherein the optical axes of the oxide crystal is set parallel to the optical axis of the illumination optical device (see figure 12). Kato et al teaches that the diffractive optical element has a surface shape formed by dry etching (see section[0061]) and the diffractive optical element transforms an incident light beam into a light beam having a given light intensity distribution. Kato et al further teaches a projection optical system (13) for projecting and exposing a patterned of a mask (R) arranged on the irradiated plane on a photosensitive substrate (W). Kato teaches the diffractive optical element being adapted for use with light of a wavelength 248 nm from a KrF excimer laser (see section [0046]). Thus, Kato discloses substantially all of the limitations of the instant claims as recited, Kato does not expressly disclose that the light beam having an energy density of $1\text{mJ}/\text{cm}^2/\text{pulse}$ or more passes or $100\text{mJ}/\text{mJ}/\text{cm}^2/\text{pulse}$ or more passes the diffractive optical element. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workage ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Furthermore, Hiraiwa et al discloses an illumination optical device for illuminating an irradiated plane having an optical element arranged in an optical path between the light source and the irradiated plane through which a light beam from a KrF excimer laser having an energy density of $400\text{ mJ mJ}/\text{cm}^2/\text{pulse}$ passes (see col.10, lines 15-18). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kato et al and Hiraiwa to obtain the invention as specified in the instant claims. As suggested by Hiraiwa, it would have been obvious to a skilled artisan to design the diffractive optical element of Kato in such a way that the light beam having an energy density of $1\text{mJ}/\text{cm}^2/\text{pulse}$ or $100\text{ mJ}/\text{cm}^2/\text{pulse}$ or more can

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pass. The purpose of doing so would have been to improve the durability required of an optical for use in the UV lithography and to improve the quality of the images to be printed.

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al (US 2002/0030890 A1 in view of Hiraiwa et al (U.S.Pat. 5,699,183) and further in view of Komatsuda et al (U.S.Pat. 6,563,567).

As to claim 19, Kato as modified by Hiraiwa discloses an illumination optical system and method having substantially all of the structures set forth in the instant claim as discussed, except for an optical integrator for forming a secondary light source in a given shape on an illumination pupil plane based on a light beam through the diffractive optical element. Komatsuda et al discloses an illumination optical system having a diffractive optical element (6) and an optical integrator (8) for forming a secondary light source in a given shape on an illumination pupil plane based on a light beam through the diffractive optical element (see figure 1). It would have been obvious to combine the teachings of Kato as modified by Hiraiwa and Komatsuda to obtain the invention as specified in the claim 19 of the present invention. It would have been obvious to a skilled artisan to employ an integrator as suggested by Komatsuda into the illumination of Kato as modified by Hiraiwa for generating a desired intensity distribution thereby improving the resolution of the printed images.

Prior Art Made of Record

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Tanitsu et al (U.S.Pat. 6,741,394) and Sakuma et al (U.S.Pat. 6,377,332) disclose illumination systems and have been cited for technical background.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Henry V. Nguyen whose telephone number is 571-272-2124. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on 571-272-2258. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Hung Henry V Nguyen
Primary Examiner
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hvn
7/21/06